

# **UNLOCKING METHOD BY IDENTIFICATION OF COLORED LIGHT RAYS AND UNLOCKING APPARATUS USING THIS METHOD**

## **BACKGROUND OF THE INVENTION**

### **1. Field of the Invention**

The present invention is related to an unlocking method, and more particularly to an unlocking method by identification of colored light rays and an unlocking apparatus using the method.

### **2. Description of Related Art**

A conventional lock generally has a plurality of pins mounted in a lock core with various arrangements and is unlocked by a key with a plurality of teeth corresponding to the pins. However, the conventional lock has not enough security to prevent a thief from unlocking the lock by using a simple tool instead of a correct key.

For promoting the security, another lock using identification of light rays is invented. The lock has an emitting member to give off light rays and a receiving member to receive the rays respectively installed at two sides of a keyhole of a lock core. A correct key for the lock has a plurality of openings corresponding to positions of the lights. When the correct key is inserted in the keyhole, the light rays from the emitting member can pass through the openings and be received by the receiving member, so the lock can be unlocked.

However, this lock also has a low security and is easy to be unlocked in an unauthorized manner.

Therefore, the invention provides a lock to mitigate or obviate the aforementioned problems.

1     SUMMARY OF THE INVENTION

2             The main objective of the present invention is to provide an unlocking  
3     method by identification of colored light rays which promotes the security of a  
4     lock.

5             Another objective of the present invention is to provide an unlocking  
6     apparatus using the unlocking method.

7             Other objectives, advantages and novel features of the invention will  
8     become more apparent from the following detailed description when taken in  
9     conjunction with the accompanying drawings.

10    BRIEF DESCRIPTION OF THE DRAWINGS

11            Fig. 1 is an exploded perspective view of an unlocking apparatus in  
12    accordance with the invention;

13            Fig. 2 is a schematically sectional view of the unlocking apparatus in Fig.  
14    1 when a key is inserted in a keyhole; and

15            Fig. 3 is a schematically sectional view of another embodiment of the  
16    unlocking apparatus in accordance with the invention.

17    DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

18            With reference to Figs. 1 and 2, a lock (not shown) has a cylinder (not  
19    shown) installed in a doorframe, a lock core (not shown) rotatably received in the  
20    cylinder and a keyhole (not shown) longitudinally defined through the lock core.

21            An unlocking apparatus in accordance with the invention is composed of  
22    a key (10), an emitting member (30), and a receiving member (40). The emitting  
23    member (30) and the receiving member (40) are respectively mounted at two  
24    sides of the keyhole of the lock. The emitting member (30) has a plurality of

1 illuminants (31) such as LEDs arranged along the keyhole and mounted on a first  
2 positioning strip (32). The receiving member (40) has a plurality of optical fibers  
3 (42) each with a first end in alignment with the corresponding illuminant (31)  
4 and a second end connected with a receiver (44) for identification of color. The  
5 first ends of the optical fibers (42) are mounted on a second positioning strip (41)  
6 facing the emitting member (30). The light rays given off from the illuminants  
7 (31) can be received by the corresponding optical fibers (42) and transferred into  
8 the receiver (44) for identification of color.

9           The optical fibers (42) also can be replaced with lenses (not shown) for  
10 receiving and transferring the light rays.

11           The key (10) has a shank (not numbered) for inserting in the keyhole,  
12 and a plurality of openings (11) is defined through the shank and respectively  
13 aligned with the illuminants (31) and the distal ends of the optical fibers (42).  
14 Each of the openings (11) has a transparent colored plug (20) mounted therein.  
15 The colored plugs (20) have various colors with a predetermined arrangement.

16           When the key (10) is inserted in the keyhole, white light rays from the  
17 illuminants (31) pass through the respective transparent colored plugs (20) and  
18 become light rays with various colors corresponding to the transparent colored  
19 plugs (20) and are received by the optical fibers (42) and the receiver (44).

20           When assembly of the lock, the correct color arrangement of the  
21 transparent plugs (20) is set and stored in the lock. If the light rays passing  
22 through the transparent plugs (20) have a color arrangement that coincides with  
23 the stored arrangement, the lock can be unlocked. Otherwise, the lock cannot be  
24 unlocked.

1           Therefore, an unlocking method according to the present invention has  
2   the following steps of:

3           1. Initially, an original key is inserted in the keyhole of the lock core;

4           2. White light rays are given off from the emitting member and which  
5   then pass through the transparent colored plugs;

6           3. The light rays passing through the transparent colored plugs are  
7   received by optical fibers and transferred into a receiver, and the color  
8   arrangement of the light rays is set and stored;

9           4. A key is inserted in the keyhole for unlocking, and white light rays are  
10   given off from the emitting member and which then pass through the transparent  
11   colored plugs;

12          5. The colored light rays are received by the optical fibers and  
13   transferred into the receiver;

14          6. The color arrangement of the key is compared with the stored  
15   arrangement to identify the key.

16          With reference to Fig. 3, in another embodiment of the invention, the  
17   unlocking apparatus has an emitting and receiving assembly (50) installed at a  
18   side of the keyhole. The emitting and receiving assembly (50) has an emitting  
19   member being composed of a plurality of illuminants (51) mounted on a  
20   positioning strip (53) at the side of the keyhole. A receiving member has a  
21   plurality of optical fibers (54) respectively mounted beside the illuminants (51)  
22   and connected with a receiver (52). A key (60) has a plurality of reflective  
23   colored plugs (61) mounted in a shank thereof and respectively aligned with the  
24   illuminants (51) and the optical fibers (54). The reflective colored plugs (61)

1     have various colors with a predetermined arrangement.

2             When the key (60) is inserted in the keyhole, white light rays emitted  
3     from the illuminants (51) are reflected by the reflective colored plugs (61) and  
4     become colored light rays received by the optical fibers (54) for identification. In  
5     a situation of the color arrangement of the reflected light rays coinciding with the  
6     stored arrangement, the lock can be unlocked.

7             Moreover, the key of the present invention also can have a plurality of  
8     teeth formed on the shank as in a common key matching a mechanical lock for  
9     increasing its security.

10            Because the colored plugs (20, 61) of the key (10, 60) can have  
11     numerous arrangements, it is difficult for a thief to unlock a lock made in  
12     accordance with the present invention.

13            It is to be understood, however, that even though numerous  
14     characteristics and advantages of the present invention have been set forth in the  
15     foregoing description, together with details of the structure and function of the  
16     invention, the disclosure is illustrative only, and changes may be made in detail,  
17     especially in matters of shape, size, and arrangement of parts within the  
18     principles of the invention to the full extent indicated by the broad general  
19     meaning of the terms in which the appended claims are expressed.

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